# U.S. Coral Reef Monitoring Project Survey

## Part 1.  Project Summary

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**Project title:** Importance of Bank Barrier Reef Lagoon Habitat on Post-Settlement Juvenile and Sub-adult Coral Reef Fish

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### Principal investigators

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**Keywords** (provide several keywords that describe project data):

CORAL REEF FISH
ESSENTIAL HABITAT
JUVENILE FISH

VISUAL CENSUS
LONG-TERM MONITORING

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**Project Summary:**

The life history of most coral reef fishes is a two-phase cycle (juveniles and adults are demersal, while larvae are planktonic), which serves to decouple adult reproduction from recruitment of new individuals into the local population. Larvae of some species settle into habitats that are distinct from those of adults, resulting in a three stage life history; larval (planktonic), juvenile (demersal), and adult (demersal).

Nearshore habitats provide nursery areas for juveniles of many coral reef fishes, but the importance of these habitats is unclear. One school of thought proposes that recruitment processes, which involve the larval phase and the recruitment transition, are the most important influences of fish abundance. Others (reviewed in argue that post-recruitment processes, which involve juvenile and adult phases and the juvenile-adult habitat transition, are more influential in determining reef fish abundance.

The goal of this research is to determine to what extent lagoon habitats are essential to coral reef fishes. This is a two-phase process (each phase encompassing one year) involving observation and experimentation. The objective of Phase I is to quantify the use of lagoon habitats as nursery areas by post-settlement, juvenile, and sub-adult life stages of coral reef fishes, and to determine the abundance of sub-adults and adults, of species utilizing lagoon nursery areas, in adjacent bank-barrier reefs.

The objective of Phase II is to determine the extent to which lagoon habitat influences sub-adult and adult abundance on adjacent coral reefs. The most heavily used nursery habitats, as determined in Phase I, will be augmented prior to Phase II. The null hypothesis (Ho) of Phase II is that a change in amount of lagoon nursery habitat will produce no change in the abundance of sub-adult and adult fishes on adjacent coral reefs.

Six isolated sections of bank-barrier reef and adjacent lagoon (three experimental and three      control) are under study on St. Croix, U.S. Virgin Islands. Lagoons and bank-barrier reefs will be visually censused with 50 m x 2 m transects every four months, providing estimates of seasonality, species composition, relative abundance, size composition, and habitat associations.

This research will advance the knowledge of ecological processes of coral reef fishes, and is designed to address the following questions. In what stages are the bottlenecks that effect the population size and community structure of fishes on coral reefs, and how do these bottlenecks differ among species? How important are post-recruitment processes in determining abundance of adults for fishes using lagoon nurseries?

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**Spatial Coverage of Database**

**Spatial Coverage (briefly describe geographic extent of project):**

This project is being conducted in near-shore waters on the eastern half of St. Croix.

**Geographic Extent (Bounding rectangle in decimal degrees);**
        North_____West_____South_____East_____

**Are data aggregated into geographic units:**        [x] yes          [ ] no
**Are data available in disaggregated form:** [x] yes          [ ] no

**How was spatial accuracy determined:**
        [ ] NOAA Nautical Chart   [x] USGS Quad  [ ] Loran   [ ] County Road Map
        [ ] Survey                      [ ] GPS                 [x] Other:  triangulation of landmarks

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**Temporal Characteristics of Database**

**Temporal characteristics (brief narrative):**

This project began in June 1999 and will continue for a period of 2 years. Sampling is conducted for a 3 week period, every 4 months.

**Period of Record:**
Begin (d/mo/yr): June 1999                                         End (d/mo/yr): February 2001

**Sampling is:**     [x] Ongoing        [ ] Planned        [ ] Historic

**Frequency of Sampling:**
[ ] Hourly   [ ] Daily   [ ]Weekly   [ ] Monthly   [ ] Annually   [x] Other: every 4 months

**Sampling Interval:**
                              [x] Fixed                              [ ] Intermittent

**How is sampling recorded?**
                              [ ] Automated              [x] Non-automated
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**Data Parameters:**

**Specific Constituents/Parameters Sampled (include units):**

SPECIES OF FISH
NUMBER OF FISH IN 3 SIZE CATEGORIES
NUMBER OF FISH IN 5 HABITAT CATEGORIES
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**Methodology:**

**Provide a short description about how monitoring data are gathered/acquired:**

During each sampling period, visual censuses of each of the 6 sampling stations are conducted twice on non-consecutive days. Each site contains two different types of habitats which are classified as lagoons and back reefs. Random, overlapping transects that measure 50 m in length and 2 m in width are set up in each sampling site. In back reef areas, investigators are able to census 14 transects each day, while in lagoons they are able to census 20.

**On what basis were sites selected?**

The selection of sites was based on the limited number of bank barrier reefs that exist on St. Croix.

**How are samples processed, stored, and archived in the field?**

Data is recorded on an underwater slate.

**How are samples processed, stored, and archived in the laboratory?**

Data is entered into a computer database.

**What methods were used for sample analysis and quality assurance?**
          [x] **Data quality analysis**
          Two divers participate in the visual censuses. Thus, it is possible for them to check the accuracy of their observations during a post-sampling debriefing in which any unusual observances may be discussed. The repeatable design of this project also contributes to its quality assurance.

**[ ] Chemical analysis**

**Describe any assumptions in assembling/acquiring monitoring data:**

The principal assumptions of this project are that diver bias is consistent throughout the project and that sampling is repeatable.

**Describe the primary limitations with monitoring data:**

The primary limitations of this project are:
1. It has a method that is time and labor intensive.
2. Some diver bias may exist.
3. Some types of juvenile fish can only be identified at the genus level.
4. Visual transects provide estimates rather than absolute counts of fish.
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**Database Characteristics:**

**Format:**
       [x] Digital                                [ ] Map
       [x] Hardcopy (reports, data sheets, tables)     [ ]Other_____

**Status (check one):**
       [ ] Database Available/Being Distributed     [ ] Portions of Database Available
       [x] Data Not Available                  [ ]Other_____

**Predominant Data Type:**
                       [x] Numeric                   [ ] Qualitative

**How is data stored (hardware & software):**

Hardware= P.C. and back-up floppy disks
Software= Paradox and Excel

**Data Structure:**
[ ] Discrete Points (sampling site) [x] Line/transect (e.g., shoreline, beach)
[ ] Polygon (watershed)

**Data Completeness (check one):**
[x] Data clean   [ ] Data need minor work   [ ] Data need major work   [ ] Other: The data is not yet available.

**Data Maintenance (check one):**
[x] No maintenance   [ ] Intermittent maintenance   [ ]Periodic maintenance (fixed intervals)
[ ] Continuous maintenance     [ ] Other: The data is not yet available.

**Are the following elements in this database available for each sampling location (check all that apply)?**
       [ ] Station Location (lat/long coordinates of site or areal unit)
       [x] Frequency of Sampling (by station location)
       [x] Constituents/Parameters Sampled (by station location)
       [x] Period of Record
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**Use and Users:**

**How is data used?**

[x] Research

[x] Monitoring

[x] Planning

[ ] Management

[ ] Regulatory

**Users (identify specific institutions):**

[x] Federal Government:  Caribbean Fisheries Management Council

[x] State Government:  USVI Division of Fish and Wildlife

[ ] Local Government

[ ] Regional Entities

[x] Academic:  University of Massachusetts--Boston
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**Data Availability:**

**On-line (describe how to access, i.e., bbs, Telnet, world wide web):**

No.

**Off-line: (describe how to access):**

Contact principal investigators.

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**Are costs associated with requests?**          [ ] yes                [x] no
**If yes, please explain:**


**Access constraints (describe briefly any constraints for accessing data set):**

The data set is still incomplete.  It is not likely that there will be additional constraints once all the data has been entered into the database.

**Use constraints (describe briefly any constraints for using data set):**

None.

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